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ABSTRACT

Despite interest in the impact of undergraduate research on student development in higher education literature, there has not been much work done on the relationship between participation in undergraduate research and the development of political science students. This paper assesses the relationship between student participation in collaborative research projects with faculty and student learning (operationalized in terms of scores on the major field aptitude test [MFAT] in political science) and the likelihood of entrance into professional or graduate school. The paper outlines the basic features of the undergraduate political science major at Truman State University (Missouri), highlighting how research is generally integrated into the program. It is found that participation in collaborative research with faculty, in general, is associated with improved student learning in political science and a greater likelihood that students will proceed on to graduate/professional school. (Contains 30 references, 5 tables, and 4 notes.) (Author/BT)

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Participation in Undergraduate Research and the Development of Political Science Students

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Participation in Undergraduate Research and the

Development of Political Science Students

Abstract

Despite the great interest in the impact of undergraduate research on student development in the literature on higher education, there has not been much work done on the relationship between participation in undergraduate research and the development of political science students. This paper assesses the relationship between student participation in collaborative research projects with faculty and both student learning (operationalized in terms of scores on the Major Field Aptitude Test [MFAT] in political science) and the likelihood of entrance into professional or graduate school. We find that participation in collaborative research with faculty, in general, is associated with improved student learning in political science and a greater likelihood that students will proceed on to graduate/professional school.

Recently, many scholars in higher education have argued that participation in undergraduate research is of great benefit to students (Boenninger and Hakim, 1999; Spilich, 1997). For instance, many point to the student-faculty interactions outside of the classroom that accompany undergraduate research as playing a key role in the academic achievement, retention and performance of undergraduates (Astin, 1993; Pascarella and Terenzini, 1991; Tinto, 1998). In addition, Eddins, Nikolova, Williams, Bushkek, Porter and Kineke (1997) and James (1998) contend that participation in undergraduate research makes it more likely that students master complex scientific concepts and develop advanced critical thinking skills that are beneficial to students who proceed onto graduate school (Sakalys, 1984; Peppas, 1981). Volkwien and Carbone (1994) suggest that undergraduate research has a positive impact on undergraduate intellectual growth and personal satisfaction. Wubah, Gasparich, Schaefer, Brakke, McDonald and Downey (2000) and Gregerman (1999) contend that participation in undergraduate research dramatically improves the retention of minority students.

Despite the great interest in the impact of undergraduate research on student development in the literature on higher education, there has not been much work done on the relationship between participation in undergraduate research and the development of political science students. To be sure, there have been a articles that have appeared in publications like PS that focus on the benefits of undergraduate participation in a group research project (Rosenthal, 1999; Bernotsky and Kennedy, 2001) or speculate on how participation in undergraduate research might be beneficial to students with different learning styles (Fox and Ronkowski, 1997). Further there have been a few conference presentations on techniques designed to promote undergraduate research (see Williams, 1998a and 1998b) and some published work has investigated methods used to improve undergraduate student learning of research techniques

(McBride, 1996). Recently the American Political Science Association (APSA) has even begun to promote on its web site the Council of Undergraduate Research (CUR), an organization that champions collaborative research, perhaps signaling a new emphasis on the promotion of individual collaborative research in political science. However, to date there is no secondary literature in political science that *systematically* analyzes the relationship between *collaborative* undergraduate research (meaning individual collaboration between faculty and student) and student learning. This paper seeks to assess this relationship between participation in collaborative undergraduate research on both student learning (operationalized in terms of scores on the Major Field Aptitude Test [MFAT] in political science) and the likelihood of entrance into professional or graduate school.

The Benefits of Collaborative Undergraduate Research

There has been a considerable amount of general literature in higher education scholarship that has outlined the benefits of an undergraduate research experience on student development. The many benefits cited include that students (1) gain experience and learn about the research process by working on an unsolved, open-ended research problem; (2) increase their disciplinary knowledge and their understanding of how that knowledge may be applied; (3) define and refine their research and career interests; (4) learn about the world of academia and graduate school life; (5) are provided with a forum for collegial interaction with a faculty member (Alexander, Foertsch, Daffinrud and Tapia 2000; Nagda, Gregerman, Jonides, von Hippel, and Lerner 1998). In particular, it has been argued that undergraduate research forges close student-faculty connections, which is particularly useful in promoting what Vincent Tinto (1975) has called the "academic integration" of students into university life. Further, it has been argued that participation in undergraduate research is particularly successful in promoting

retention of higher risk students, especially for African American students and students with low achievement (see also Gregerman, 1999).

Does participation in undergraduate research affect the learning of undergraduate students? Some scholars have argued that students who participate in undergraduate research are more likely to master scientific concepts because they see how these concepts translate into solving real world problems (James, 1998; Volkwien and Carbone, 1994). Others argue that by conducting research, students take charge of their own learning and are more likely to internalize knowledge over which they feel some sense of "proprietary ownership" (Rosenthal, 1999; Bernotsky and Kennedy, 2001; Ishiyama and Hopkins, 2001a; 2001b; Nnadozie, Ishiyama and Chon, 2001). Still others point to the individualized attention students receive from faculty when working on collaborative projects that enhance student confidence and consequently promotes student learning (Koch and Johnson, 2000; Jacobi, 1991; Blackburn, Chapman and Cameron, 1981). However, as Spilich (1997, p. 57) notes, despite the widely accepted argument that undergraduate research has substantial benefits for students, the "belief that research experience enhances the education of undergraduates .... is based mostly on anecdotal evidence." **In fact, there is very little empirical evidence that collaborative undergraduate research leads to a tangible payoff for the intellectual growth of students. This absence is particularly striking in political science.**

So does participation in undergraduate research improve student learning in political science and increase the likelihood that students will proceed on to graduate/professional school? In the following sections we first outline the basic features of the undergraduate political science major at Truman State University, highlighting how research is generally integrated into the program. However, only recently have faculty and students begun substantial collaboration in

producing presentable research projects. Second, we then assess whether this student-faculty research collaboration is related to student learning and graduate/professional school placement.

Student Research in Political Science at Truman State University

Truman State University is the highly selective public liberal arts and sciences university of Missouri. With a student population of about 6000, it is located in the rurally isolated northeastern part of the state. The political science program at the university has eight full time faculty members, and approximately 150 majors.

Since its establishment in 1867, Truman State University has undergone a series of transitions ranging from normal school to state teachers college to state college to comprehensive state university. In 1985, Truman sought and received approval to become the statewide public liberal arts and sciences university. In 1992, the university became Missouri's only public institution to adopt the "Highly Selective" classification for undergraduate admission, student progression, and graduation purposes. As a result of this mission change, and in light of the recommendations put forth by the APSA *Task Force on the Political Science Major* (see Wahlke 1991), the major at Truman was completely restructured.[1] Prior to the mission change and prior to the restructuring of the major, the political science major at the university was structured like many others across the country– The major may had only one required course – students were free to sample various subfields of political science or, conversely, to concentrate only on a specific subfield (such as comparative politics). Frequently, the course offerings depended to a large degree on the specialties and interests of the faculty. Methodology was not a major requirement and the conduct of undergraduate research was not promoted. Morever, prior

to move to systematic assessment of all aspects of the curriculum, relatively little data was collected on outcomes, and no data was collected on the impact of undergraduate research

The current structure of the major is radically different from the past and, unlike many institutions, the political science program at Truman State University does not require students to complete a senior thesis *per se* (Breuning, Parker and Ishiyama, 2001; Ishiyama and Hartlaub, 2000). Rather, the political science curriculum is structured so students are exposed to research methodology very soon in their academic careers, generally as first term sophomore students. In other words, rather than have students complete a substantial research project at the end of their tenure at the university, students are required to complete a substantial research project earlier on. This is consistent with some of the observations made by Spilich (1997). As he noted, the existence of a senior thesis alone is not sufficient to produce the benefits of undergraduate research often cited in the literature. Indeed, he recommends the integration of research across the curriculum, with a substantial research experience occurring early on in a student's academic career.

In the Truman State University political science program research has been integrated into the course structure, as opposed to being "tacked on" at the end of an undergraduate's career. To accomplish this, the political science major is structured so that students are required to take courses in all of the major subfields of political science (American Politics, International Relations, Methodology, Comparative Politics, Public Policy, and Political Thought). Each of these courses emphasize principles and theories over substance, with the aim of shaping the way students think about politics. Further, the team taught capstone course (Senior Seminar) summarizes the political science experience and emphasizes connections between subfields. Since innovations in political science inquiry (as with other fields) involves integration of

concepts across several subfields, the curriculum is designed to promote students to "think theoretically." Over the course of the term, the students get an intensive survey of the major schools of thought in political science B many of which they have already encountered in their earlier course work. These required courses are generally taken sequentially, with each course consciously designed to build on the skills developed in previous courses. Students also have the opportunity to take elective courses (which approximate the distributional courses listed in many other majors at other universities) but these are quite limited. The political science program at Truman State University emphasizes principles over substance, resulting in a structured and sequenced major where courses are designed to fit together as a coherent whole.

The course that introduces students to the research process is Political Science Methodology. The methodology course is specifically designed to be a "how to" course and is built around the completion of a quantitative research project. This class is generally taken in the first term of the sophomore year (after taking introductory level courses - American National Government and International Relations in the first year). During the course of the term, students are exposed to the basic process of conducting research, including formulating the research question, putting together the literature review and design and methodology sections (including operationalization of variables), and conducting quantitative analysis. Students are taught the tools to use in conducting quantitative analysis, ranging from non-parametric tests and contingency table analysis, to ordinal logistic regression (ordered logit). Emphasis is placed on how to use SPSS to generate results and how to interpret results, rather than discussing in depth how to calculate these statistics by hand. Indeed, it has been our experience that students learn statistics much better when used in application to projects in which they are interested rather than beginning with the "theory" behind these statistics.

The projects produced in the methods class are invariably very rough and often quite rudimentary. However, the production of publishable research is not the goal of the course. Rather, providing students with the opportunity to complete the research process from beginning to end cultivates in students the confidence that they can conduct quantitative research in political science. Further, by completing the project, they are more likely to see the flaws in the project, and what is necessary to improve it.

The course that introduces students to qualitative/case study research is Principles of Public Policy (generally taken in the second term of the sophomore year). In this course, students are required to complete a substantial research project that deals with the close investigation of a single policy act. However, what is required is not merely an atheoretical description of the case, but rather the use of the case as a test of existing theory. Thus, as is with quantitative research, there is an introduction and literature review, and an examination of the empirical evidence in light of the theoretical framework that is derived from the literature review. Once armed with these research "templates" subsequent courses seek to provide opportunities for students to gain further experience in conducting quantitative and qualitative research.

Despite emphasizing research throughout the curriculum for many years, only recently have students and faculty begun to collaborate on research projects outside of the classroom. These collaborations have been entirely voluntary. From the Fall of 1996 to December 2000, twenty-three students collaborated with faculty on research projects that resulted in a conference/public presentation. Since 1997, student-faculty coauthored projects have been presented at professional meetings such as the American Political Science Association, the Midwest Political Science Association, the International Studies Association-Midwest, the Southwest Social Science Association, and the Central Slavic Association. In addition,

collaborative research has also been presented at undergraduate research conferences, including the Ronald E. McNair National Conference, the National Conference on Undergraduate Research, and the Truman State University Undergraduate Research Symposium.

The Effects of Collaborative Research

What effect has project- based collaborative research had on the quality of the undergraduate political science experience at Truman State University? We measure student involvement in research by using students engaged in collaborative research with faculty that is presented at a professional conference or public colloquium. This indicator was chosen over other potential measures for several reasons. Counting the number of student research projects was not a good measure of student participation, since some projects have only a single student collaborator and others have many. Counting student-faculty coauthored publications is also not the best measure in that even worthwhile student-faculty projects fail to produce publishable results. Thus, conference presentations represent an adequate indicator of student-faculty research collaboration.

To measure student achievement, it is important that outcomes be measured in terms that allow for comparisons between students who have participated in collaborative research with those who have not. We used the Major Field Aptitude Test (MFAT) Political Science II produced by Educational Testing Services (ETS). The Major Field Test program is an innovative battery of undergraduate outcomes tests that is used by schools and departments at more than 600 colleges and universities globally to measure student academic achievement and growth. Academic departments benefit from the use of the tests as the scores allow for detailed curriculum review and evaluation and allows for comparison of test scores with national

comparative data. The MFAT - Political Science II is a widely used test to assess the learning of political science students. The Major Field Test in Political Science consists of 120 multiple-choice questions, some of which are grouped in sets and based on such materials as theory passages, statistical tables, matrices, and sets of ungrouped data. The questions are drawn from the courses of study most commonly offered in undergraduate programs; the diversity of curricula is taken into account.

The major content areas covered on the test and the approximate distribution of questions among the areas are:

1) United States Government and Politics (28-31 percent of the questions)

2) Comparative Politics (20-23 percent of the questions)

3) International Relations (23-26 percent of the questions)

4) Political Theory and Philosophy (16-29 percent of the questions)

5) Methodology (10 percent of the questions)

Political Science seniors at Truman State University have been taking this nationally normed test since 1990. This test is designed to measure the knowledge of political science graduating seniors have accumulated in their years at the university. The reported composite score is based on two subscores – *United States Government and Politics* and *Global Political Understanding* – and ranges from 0 to 200. In 1996-99, 96 colleges and universities used the MFAT -- Political Science II, and 2735 students nationwide took the test.

The 124 graduating seniors in political science from Truman State University who took the MFAT from the Fall of 1996 to December 2000, constituted the number of cases for this

study. The data from the Spring of 2001 were excluded, since by the time of the writing of this article the MFAT scores had not yet been reported. Of the 124 students, 23 were identified as having participated in collaborative research with a faculty member leading to a conference/public presentation.

(Table 1 about here)

Table 1 reports the general difference between students who participated in collaborative research with faculty and student performance on the MFAT. As indicated in Table 1, students who participated in collaborative research generally performed better on the MFAT than did students who did not participate in collaborative research with faculty. Indeed 82.6% (19 of 23) of the students who participated in collaborative research scored at the 80^{th} percentile or above on the MFAT as opposed to 55.4% (56 of 101) of students who did not participate in collaborative research with faculty, and this difference was statistically significant (chi-square = 5.8, p=.01).

However, it might be argued that students with high ability are attracted to conducting research and, hence, performance on the MFAT may be due more to the ability of the students than it does to any "value added" by participating in collaborative research with faculty. In order to address this issue we try to control for variations in ability by considering entering composite ACT scores. Although it might be argued that ACT is not a valid measure of ability, we employ this measure for two reasons. First, there are really no widely accepted alternatives that exist to measure the academic ability of incoming students prior to being "exposed" to college, save for reported High School Grade Point Average (which is even less reliable than ACT score). Second, if nothing else, ACT scores measure "raw ability," which, although it may not necessarily

translate into student success, does, to some extent, measure student "potential." Thus, for our purposes, ACT score acts as reasonable proxy measure of incoming student ability prior to being exposed to the political science major at Truman State University.

Tables 2 & 3 report MFAT performance, controlling for the entering composite ACT score. A cutoff was affixed at 27, which represented the median value of the distribution of ACT scores for the 124 students. Table 2 reports the MFAT score by whether or not the student participated in collaborative research with a faculty member, for students who scored less than 27 on the ACT. As indicated, a larger proportion of students who participated in collaborative research scored 27 and above (18 of 23 or 78.3%) than did students who did not participate in collaborative research (45 of 99 or 45.5%).[2] This might suggest that high ability students are attracted to collaborative research. In addition, collaborative research appears to have more of an effect on high ability students than on students who scored relatively lower on the ACT. Only one of the five students who participated in collaborative research, and who had scored less than 27 on the ACT, scored at the 80th percentile and higher on the MFAT. This result is not so different from the general pattern for those who scored less than 27 (chi-square = .97). On the other hand, for students who scored 27 or higher on the ACT, all 18 (100.0%) who participated in collaborative research scored at the 80th percentile or higher, as compared to a 71.1% rate for students who did not participate in collaborative research, and this difference was statistically significant (chi-square = 6.6 p = .01). This result suggests that participation in collaborative research greatly assists bright students in learning political science.

(Tables 2 & 3 about here)

Tables 4 & 5 report the results for another indicator of student success – graduate or professional school placement within one year following graduation (this includes acceptance into graduate/professional school) controlling for ACT score. Interestingly, as reported in Table 4, of the five students who participated in collaborative research with faculty, and who had scored less than 27 on the ACT, four (80.0%) were admitted to graduate/professional school within one year of graduation. This rate is much higher than the 27.8% (15 of 54) of students who scored less than 27 on the ACT and who were admitted to graduate/professional school. Moreover, this difference was statistically significant (at chi-square= 5.7 and p=.02). Thus, although participation in research may not necessarily lead to better performance on the MFAT for students who scored less than 27 on the ACT, participation in collaborative research does appear to positively impact the student's likelihood of proceeding on to graduate/professional school. This finding is consistent with our own experiences in collaborating with students in conducting research. Collaborative research cultivates close student-faculty ties, which provides students with strong letters of recommendation, and faculty who are willing to "go to bat" for their students in order to secure places for them in graduate school.

(Table 4 & 5 about here)

Table 5 reports the results for students who scored 27 and higher on the ACT. As indicated although graduate/professional school entrance is quite high for students who did not participate in a collaborative research project (62.2%) it is significantly higher (88.9%) for students who participated in collaborative research leading to a presentation (chi square = 4.4, p=.04). This indicates that students of very high ability are more likely to attend

graduate/professional school after participating in collaborative research, than those who did not participate in such research collaboration with faculty.

Conclusions

Does participation in undergraduate research improve student learning in political science and increase the likelihood that students will proceed on to graduate/professional school? From the above results, the answer is generally "yes." Indeed, participation in research appears to have very tangible benefits for high ability students. Participation in collaborative research for students who scored 27 and above on the ACT was related to significantly higher MFAT scores and a significantly higher likelihood of being admitted to graduate/professional school than for students who did not participate in collaborative research. However, the results for students with less "raw" ability were more mixed. Research participation was not associated with better performance on the MFAT, but was associated with higher graduate/professional school placement rates. The former result is perhaps due to the difficulties in taking standardized tests rather than failures in the program (i.e. lower performance on the ACT is indicative of generally poorer performance on standardized tests rather than less "learning"). The latter result is indicative of the importance of research in cultivating close student-faculty ties, which is so important in the graduate/professional school application process. Nonetheless, the small number of individuals (5) who participated in collaborative research and who scored less than 27 on the ACT makes it difficult to claim anything conclusively. This will have to wait until the expansion of collaborative research opportunities to students with less raw "ability."

The above findings must be considered preliminary, rather than conclusive, for two reasons. First, although the evidence indicates that participation in collaborative undergraduate

research as positive benefits for students in political science at a single institution, it is not clear whether this relationship holds for other institutions. Second, it is not clear (given the lack of base line data since the records on participation in undergraduate research were not kept prior to the structural change of the major) whether changing the curriculum and promoting more collaborative undergraduate research has "added-value" to student learning across student cohort groups.

As to the first concern, the conduct of a comparative study is, to say the least, a daunting (if not currently impossible) task. It would require obtaining individual student records on participation in research and individual scores on the MFAT tests, which, for a variety of reasons (particularly maintaining student confidentiality), institutions are not willing to provide for external examination. Thus, a comparative study that could test the "external validity" of these findings will have to wait until others replicate this study in different institutional settings. As to the second concern, given the lack of baseline data on collaborative undergraduate research prior to the introduction curricular changes in the political science major it is simply not possible to compare cohorts of students in the aggregate across time. Nonetheless, the individual level data available (which compares participants in collaborative research versus non participants) *does support* the notion that participation has a positive effect on student learning and student success.

As a shift occurs in higher education away from "passive" forms of learning to the promotion of more "active" forms of student learning, the role of collaborative student-faculty research will become increasingly more prominent, particularly at primarily undergraduate institutions. Not only is student research the most "active" of active learning strategies, but providing students with a hand in their own education will ultimately produce better prepared and more productive political science graduates.

Table 1: Political Science Senior MFAT Scores by Whether Student Participated in Collaborative Research Project Leading to a Presentation

	Did not Participate in Collaborative Research	Participated in Collaborative Research	Total
Scored less than 80th percentile on MFAT	45 (44.6%)	4 (17.4%)	49
Scored at 80th percentile and above on MFAT	56 (55.4%)	19 (82.6%)	75
Total	101	23	124

chi-square = 5.8
P= .01

Table 2: Political Science Senior MFAT Scores by Whether Student Participated in Collaborative Research Project Leading to a Presentation Controlling for Entering Act Composite Score less than 27

	Did not Participate in Collaborative Research	Participated in Collaborative Research	Total
Scored less than 80th percentile on MFAT	31 (57.4%)	4 (80.0%)	35
Scored at 80th percentile and above on MFAT	23 (42.6%)	1 (20.0%)	24
Total	54	5	59

chi-square = .97

Table 3: Political Science Senior MFAT Scores by Whether Student Participated in Collaborative Research Project Leading to a Presentation Controlling for Entering Act Composite Score 27 and Greater

	Did not Participate in Collaborative Research	Participated in Collaborative Research	Total
Scored less than 80th percentile on MFAT	13 (28.9%)	0 (0.0%)	13
Scored at 80th percentile and above on MFAT	32 (71.1%)	18 (100.0%)	50
Total	45	18	63

chi-square = 6.6
P=.01

Table 4: Graduate/professional School Admission Within One Year of Graduation by Whether Student Participated in Collaborative Research Project Leading to a Presentation, Controlling for Entering Act Composite Score less than 27

	Did not Participate in Collaborative Research	Participated in Collaborative Research	
Did not enter graduate/professional school	39 (72.2%)	1 (20.0%)	40
Entered graduate/professional school	15 (27.8%)	4 (80.0%)	19
	54	5	59

chi-square= 5.7
P=.02

Table 5: Graduate/professional School Admission Within One Year of Graduation by Whether Student Participated in Collaborative Research Project Leading to a Presentation, Controlling for Entering Act Composite Score 27 or Greater

	Did not Participate in Collaborative Research	Participated in Collaborative Research	Total
Did not enter graduate/professional school	17 (37.8%)	2 (11.1%)	19
Entered graduate/professional school	28 (62.2%)	16 (88.9%)	44
Total	45	18	63

chi-square= 4.4
P=.04

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Notes

[1]These recommendations included:

1. There should be an integrated course of study rather than a disconnected set of individual courses. The purpose of such an integrated curriculum is to provide for sequential learning, with the knowledge acquired in one course being extended and developed in a subsequent course. The curriculum culminates in a senior seminar or equivalent "capstone experience."

2. The curriculum should familiarize students with the assumptions, methods, and analytical approaches of the discipline. This recommendation is easily interpreted as requiring students to enroll in a course on research design and methodology. However, political science is an eclectic discipline and the recommendation specifically stated that it is "particularly important that [students] become familiar with the problems of normative inquiry as well as those of empirical analysis, and learn to combine the two appropriately" (Wahlke 1991, 52). The goal of teaching students these analytical skills is to enable them to "comprehend and deal with the political world after graduation" in whatever role they may choose to fulfill within their society (Wahlke 1991, 50).

3. There should be a conscious effort to develop various skills. In addition to research design and statistics, the recommendations focused on writing and oral presentation skills. These are practical skills that will serve the political science major in a variety of professional pursuits.

4. Lastly, it is important to evaluate what students actually learn, so that the curriculum may better serve the learning objectives outlined above.

To these recommendations, which specifically addressed the political science curriculum, the Task Force added the proposal that the major be complemented with learning in cognate disciplines and experiential learning through internships and/or study abroad.

[2] Two international students did not take the ACT and hence were not included in the results for Tables 2 through 4.

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